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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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JAMES C. EAVES JR. GREENEBAUM DOLL & MCDONALD PLLC 3500 NATIONAL CITY TOWER 101 SOUTH FIFTH STREET LOUISVILLE, KY 40202			LEE, SHUN K	
			ART UNIT	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary	Application No. 10/810,144	Applicant(s) BALDWIN ET AL.	
	Examiner Shun Lee	Art Unit 2878	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 April 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,6,7 and 10-13 is/are rejected.
- 7) ☒ Claim(s) 3-5,8 and 9 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 3/26/04, 8/11/04, & 4/26/05 is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Drawings

1. The drawings were received on 26 April 2005. These drawings are acceptable.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).
4. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Murray *et al.* (US 2004/0051048) in view of Hurst *et al.* (US 4,471,223).

In regard to claim 1, Murray *et al.* disclose (Fig.) a flexible scintillation-type radiation detector, comprising:

- (a) an elongated flexible tube (102) having first (106) and second (104) closed ends and defining therein a scintillation chamber;

- (b) liquid scintillation material (108) substantially filling the scintillation chamber;
- (c) said first closed end (106) including a substantially optically-transparent first end closure member (optical connection or window 106); and
- (d) photodetection circuitry (112) operably positioned relative to the first end closure member to quantitatively detect scintillating photons generated in the scintillation liquid (108) indicative of radiation passing into the scintillation chamber.

The detector of Murray *et al.* lacks an opaque, flexible protective sheath substantially surrounding the flexible tube. However, scintillating fiber optics are well known in the art. For example, Hurst *et al.* teach (Fig. 1; column 2, lines 6-12) to provide a protective sheath (7) for optical fibers (6) and scintillating fibers (5) for use in combination with a source of nuclear radiation as a level sensing gauge. By definition, a protective sheath is an enveloping structure that protects. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to provide an opaque, flexible protective sheath substantially surrounding the flexible tube in the detector of Murray *et al.*, in order to protect the scintillating fiber optic detector when used in combination with a source of nuclear radiation as a level sensing gauge.

5. Claims 2 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murray *et al.* (US 2004/0051048) in view of Hurst *et al.* (US 4,471,223) as applied to claim 1 above, and further in view of Wojcik *et al.* (US 5,859,946).

In regard to claims 2 and 7 which are dependent on claim 1, the modified detector of Murray *et al.* lacks an expansion chamber having a variable volume for accommodating volumetric expansion of the liquid scintillation material, the chamber

being external of and in fluid communication with the flexible tube and including a movable wall therein. Wojcik *et al.* teach (Fig. 1) an expansion chamber (30) having a variable volume, the chamber (30) being external of and in fluid communication (26, 28) with the flexible tube (14) and including a movable wall (20) therein in order to accommodate volumetric expansion of the liquid scintillation material (16). Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to provide an expansion chamber in the modified detector of Murray *et al.*, in order to accommodate volumetric expansion of the liquid scintillation material.

6. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Murray *et al.* (US 2004/0051048) in view of Hurst *et al.* (US 4,471,223) and Wojcik *et al.* (US 5,859,946) as applied to claim 2 above, and further in view of Nath (US 3,995,934).

In regard to claim 6 which is dependent on claim 2, the modified detector of Murray *et al.* lacks that the expansion chamber has a fixed volume and is in fluid communication with the scintillation chamber. Nath teaches (column 4, lines 7-23) to provide a fixed volume expansion chamber in fluid communication with the liquid wave guide, in order to maintain a constant liquid wave guide pressure despite temperature variations. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to provide a fixed volume expansion chamber in the modified detector of Murray *et al.*, in order to maintain a constant liquid wave guide pressure despite temperature variations.

7. Claims 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murray *et al.* (US 2004/0051048) in view of Hurst *et al.* (US 4,471,223) as applied

to claim 1 above, and further in view of Majewski *et al.* ("Economical detectors based on safe liquid scintillators", Nuclear Instruments and Methods in Physics Research A 414, pg. 289-298, 1998).

In regard to claims **10** and **11** which are dependent on claim 1, the modified detector of Murray *et al.* lacks a light reflector substantially surrounding the scintillation chamber and within the protective sheath and that the light reflector includes a flexible sheet substantially surrounding the sidewalls of the flexible tube. Majewski *et al.* teach (section 3 on pg. 291) to wrap TEFLON™ tape around the quartz cuvettes containing the scintillation liquid in order to optimize light collection. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to wrap a flexible light reflective sheet substantially around the sidewalls of the flexible tube in the modified detector of Murray *et al.*, in order to optimize light collection.

8. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Murray *et al.* (US 2004/0051048) in view of Hurst *et al.* (US 4,471,223) as applied to claim 1 above, and further in view of Rozsa (US 6,407,390).

In regard to claim **12** which is dependent on claim 1, the modified detector of Murray *et al.* lacks that the photodetection circuitry includes temperature sensing circuitry that compensates for a shift in the detection of scintillating photons as a result of temperature variation in the detector. However, scintillator temperature compensation is well known in the art. For example, Rozsa teaches (column 1, line 10 to column 2, line 8) it is well known in the art to provide temperature sensing circuitry (e.g., comprising a thermistor) that compensates for a shift in the detection of

scintillating photons as a result of temperature variation in the detector. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to provide temperature sensing circuitry in the modified detector of Murray *et al.*, in order to compensate for temperature variations.

9. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Murray *et al.* (US 2004/0051048) in view of Hurst *et al.* (US 4,471,223) as applied to claim 1 above, and further in view of McDermott (US 5,457,877).

In regard to claim **13** which is dependent on claim 1, the modified detector of Murray *et al.* lacks that the flexible protective sheath is armored to resist crushing forces. However, armored protective sheaths are well known in the art. For example, McDermott teaches (column 1, lines 11-35) that armored protective sheaths comprising metal layers and/or wire mesh are used as protective sheathing for fiber optics. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to provide an armored protective sheath in the modified detector of Murray *et al.*, in order to achieve maximum protection for the scintillating fiber optic detector when used in combination with a source of nuclear radiation as a level sensing gauge.

Allowable Subject Matter

10. Claims 3-5, 8, and 9 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

11. The following is a statement of reasons for the indication of allowable subject matter: the instant application is deemed to be directed to a nonobvious improvement over the invention disclosed in US Patent Application Publication 2004/0051048. The improvements comprise in combination with other recited elements: (a) a slidable piston member is operably positioned in the scintillation chamber to define a variable volume expansion chamber free of liquid scintillation material adjacent to the second end as recited in claim 3 (and claims 4 and 5 which depend from claim 3); (b) a spring means positioned to bias a movable wall toward the liquid scintillation material as recited in claim 8; and (c) a member positioned to selectively immobilize the movable wall in a fixed position as recited in claim 9.

Response to Arguments

12. Applicant's arguments filed 26 April 2005 have been fully considered but the arguments with respect to claims 1, 2, 6, 7, and 10-13 are not persuasive.

13. Applicant's arguments, see first paragraph on pg. 11 to first paragraph on pg. 12, filed 26 April 2005, with respect to claims 3-5, 8, and 9 have been fully considered and are persuasive. The rejection of claims 3-5, 8, and 9 has been withdrawn.

In response to applicant's argument (third paragraph on pg. 7 of remarks filed 26 April 2005) that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (*i.e.*, gamma radiation) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). It should be noted that

claim 1 recites the limitation "photodetection circuitry operably positioned relative to the first end closure member to quantitatively detect scintillating photons generated in the scintillation liquid indicative of radiation passing into the scintillation chamber". Further, there does not appear to be an express definition of "radiation" as being limited to only gamma radiation, nor has applicant pointed out where in the application "radiation" is expressly defined as gamma radiation only. Applicant also argues that a person of ordinary skill in the art would not be led to modify the radiation detector of Murray *et al.* for use as a level sensing gauge since using a neutron emitting isotope as the source for an industrial level sensing gauge would be inappropriate because it is both unnecessarily dangerous and expensive. Examiner respectfully disagrees. Industrial level sensing gauge using neutrons is known in the art (see e.g., US 4,870,278). Thus it would have been obvious to one of ordinary skill in the art that radiation (e.g., neutrons and/or gamma rays) detectors have been used in the prior art for fluid level detection.

Applicant argues (first paragraph on pg. 8 of remarks filed 26 April 2005) that Hurst *et al.* do not use scintillating fiber optics as a detector. Examiner respectfully disagrees. Hurst *et al.* state (column 2, lines 6-12) that "The detector system preferably comprises an array of gamma-ray scintillators which in use are arranged along the length of the vessel containing the liquid or liquids whose level or interface is being detected. Preferably the gamma-ray scintillators comprise crystals of cesium iodide, sodium iodide, or plastic scintillators for example scintillating fibres". Thus Hurst *et al.* expressly disclose optical fibers that scintillate.

In response to applicant's argument (second paragraph on pg. 8 of remarks filed 26 April 2005) that the neutron detection scintillator would be wholly inappropriate for use as a level sensing gauge, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

Applicant argues (last paragraph on pg. 8 of remarks filed 26 April 2005) that the protective sheath 7 of Hurst *et al.* covers only the optical fibers 6. Examiner respectfully disagrees. As discussed above, Hurst *et al.* expressly disclose optical fibers that scintillate as the gamma-ray scintillator. Hurst *et al.* illustrates (Fig. 1) a protective sheath (7) housing at least one optical fiber (6) and a series of gamma-ray scintillators (e.g., scintillating optical fibers 5).

In response to applicant's argument (first two paragraph on pg. 9 of remarks filed 26 April 2005) that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, there is some teaching, suggestion, or

motivation to do so found in the references themselves. Murray *et al.* disclose a liquid fiber optic filled with a scintillating fluid. Hurst *et al.* was cited as teaching (Fig. 1; column 2, lines 6-12) to provide a protective sheath (7) for optical fibers (6) and scintillating fibers (5) for use in combination with a source of nuclear radiation as a level sensing gauge. By definition, a protective sheath is an enveloping structure that protects. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to provide an opaque, flexible protective sheath substantially surrounding the flexible tube in the detector of Murray *et al.*, in order to protect the scintillating fiber optic detector.

In response to applicant's argument (last paragraph on pg. 9 to last paragraph on pg. 10 of remarks filed 26 April 2005) that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, there is some teaching, suggestion, or motivation to do so found in the references themselves. Murray *et al.* disclose a liquid fiber optic filled with a scintillating fluid. Wojcik *et al.* was cited as teaching (Fig. 1) an expansion chamber (30) having a variable volume, the chamber (30) being external of and in fluid communication (26, 28) with the flexible tube (14) and including a movable wall (20) therein in order to accommodate volumetric

expansion of the liquid scintillation material (16). Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to provide an expansion chamber in the modified detector of Murray *et al.*, in order to accommodate volumetric expansion of the liquid scintillation material which fills the flexible radiation detector of Murray *et al.*

Applicant argues (second paragraph on pg. 12 to second paragraph on pg. 13 of remarks filed 26 April 2005) that the cited prior art are not combinable since the structures of Wojcik *et al.* and Nath are mutually exclusive. Examiner respectfully disagrees. Nath states (column 4, lines 15-23) that "Instead of an elastic liquid supply container it is also possible to provide a supply container with rigid walls, which is filled partly with a gas under pressure. The use of such an serves to keep constant the pressure, acting upon the liquid 4 in the flexible tube 3, despite variations in temperature and the like so that variations in density and transmission, which might reduce the transmission, are avoided". Thus Nath expressly teaches a rigid container as an alternative to an expansion chamber having a variable volume, in order to avoid variations in density and transmission due to temperature variations.

In response to applicant's argument (last three paragraphs on pg. 13 of remarks filed 26 April 2005) that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*,

837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, there is some teaching, suggestion, or motivation to do so found in the references themselves. Majewski *et al.* was cited as teaching (section 3 on pg. 291) to wrap TEFLON™ tape around quartz cuvettes containing scintillation liquid in order to optimize light collection. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to wrap a flexible light reflective sheet substantially around the sidewalls of the flexible tube in the modified detector of Murray *et al.*, in order to optimize light collection.

Applicant argues (first two paragraphs on pg. 14 of remarks filed 26 April 2005) that there is no suggestion that the Rozsa invention would be applicable to the structure disclosed in Murray *et al.* Examiner respectfully disagrees. Rozsa states (column 1, lines 13-20) that "A typical scintillation detector employs a scintillator, such as NaI(Tl), and a photo-detector, such as a photomultiplier tube (PMT), for detecting ionizing radiation, e.g., x-rays, gamma rays and particles such as electrons and alpha particles. The response of the aforesaid scintillation detector usually is temperature dependent, i.e., varies as the ambient temperature changes". Thus Rozsa teaches that a scintillation detector is temperature dependent. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to provide temperature sensing circuitry in the modified detector of Murray *et al.*, in order to compensate for temperature variations.

In response to applicant's argument (third paragraph on pg. 14 to second paragraph on pg. 15 of remarks filed 26 April 2005) that there is no suggestion to

combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, there is some teaching, suggestion, or motivation to do so found in the references themselves. Murray *et al.* disclose a liquid fiber optic filled with a scintillating fluid. McDermott was cited as teaching (column 1, lines 11-35) that armored protective sheaths comprising metal layers and/or wire mesh are used as protective sheathing for fiber optics. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to provide an armored protective sheath in the modified detector of Murray *et al.*, in order to achieve maximum protection for the scintillating fiber optic detector.

Conclusion

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US Patent 4,870,278 (Leonardi-Cattolica *et al.*) discloses a neutron fluid level detector.

15. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within


TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shun Lee whose telephone number is (571) 272-2439. The examiner can normally be reached on Tuesday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Porta can be reached on (571) 272-2444. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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